VALUES, AND OBJECTIVEY

AND GEREON WOLTERS

Science, Values, and Objectivity

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Preface

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Introduction

Science, Values, and Objectivity

Peter Machamer and Gereon Wolters

Most people today agree that values enter into science — some values, somehow, somewhere. Few people, if any, still uphold the notion that science in all its aspects is a value-free endeavor. Two places where it is easy to see how values may enter come quickly to mind. First, values affect researchers' decisions about which projects and problems they will work on. That someone chooses to go into AIDS research because it is well funded or because the work may help solve a pressing social problem are clearly cases where values come into play. Some scholars chose research topics that are favored by their dissertation directors. So reasons for problem selections (conscious, well thought out, unconscious, precipitous, however arrived at) often, if not always, contain a value premise.

Another area that values clearly affect comes at the other end of the process of science: the uses to which some scientific results are put. A well-known example is the research in atomic energy that was used to produce the atomic bomb for the purpose of ending World War II. Indeed, problem choice and use of results for project-oriented research for government and corporate research institutions often combine both aspects. Many projects are chosen for the putative utility of their results—for profit, public welfare, or whatever. It is, though, important to recognize that the entry of values into these decisions is not in itself bad. Values entering science in these places are only as good or bad as the values themselves.

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Now, many things might be said about the nature of values. But let us just keep it simple. We are firm advocates of the "KISS" method of philosophy (keep it simple, stupid). As a first approximation we might say that values are attached to "things" (objects, people, states of affairs, institutions, and so on) that some person, group, or institution believe to be important or significant. In a scientific context, the major way values show their importance is how they enter as premises or bases for making decisions or performing actions in the context of doing science and scientific research. That is, if scientists let certain factors affect and guide their intellectual and practical endeavors, then these factors are what they take to be important (for whatever reason). The various beliefs, techniques, and practices that scientists use to make judgments and evaluations are the loci in which values display themselves. Whether or not scientists can justify these values is a different question, which we will touch on briefly later. We are assuming that values as they occur, at least in this context, can be elucidated and made explicit, for they must play a substantive role in thinking or acting.

What we need to know now is what kinds of values there are, so that we may identify them when they occur, or elicit them when they play some nonpatent role. It also would be nice to know where, other than at the beginning and the end, values are most likely to enter into scientific decision making and practice.

But as soon as we turn to inquiring into the kinds of values there are, a veritable plethora of confusions and unclarities greets us. Just think of cognitive, epistemic, truth preserving, social, cultural, political, emotional, personal, individual, subjective, economic, moral, ethical, religious, aesthetic, prudential, pragmatic, utilitarian, deontological, peer group, and the notorious family values. The mind begins to boggle at the task of getting these all straight and of knowing, for any concrete value uncovered, which kind it is. Consider, for example, the value of having adequate evidence to support your claims. If anything, this seems clearly a cognitive or epistemic value, a value that promotes discovering truth. This value somehow distinguishes science from pseudo-science. Yet, as we shall see in detail in some of the chapters in this volume, when it comes to treating evidence statistically or to selecting the form in which the evidence is presented to test a hypothesis in question, there may be noncognitive aspects.

Simply illustrated, a person is not born with a statistical package

that may be used to process data; one must be trained by social and peer group interactions that teach one to value statistical rigor and how to use specific statistical techniques. This knowledge is, in this sense at least, a function of social value. But worse, if one then proceeds by habit to use the statistical reasoning that she has been trained in, without reflecting on its adequacy for the particular project at hand. then in what sense is this an epistemic or truth-seeking decision? At its worst the decision reflects sloth, which is, as is well known, one of the seven deadly sins. Yet, dare we say that this is the way many of us have chosen which statistical package to use? Of course, we might well favor the technique that we feel will present the data in the best light, that is, the one we believe is most likely to show a favorable result for our hypothesis. Again, pure reason as guiding principle is missing or severely compromised. But even if we have critically reflected and come to an honest decision that this technique is the best one for our type of question, many kinds of factors go into this decision. Moreover, we still may implement this value well, sloppily, carelessly, or pedantically. Are there not evaluations hidden in these adverbial descriptions? The multidetermination of such choices is unavoidable, and the choices, and the reasons entering into making them, can, collectively and individually, be either good or bad.

The values that are taken as norms of science and theorizing further exacerbate the problem, for it is not clear how to typify them. Take, for example, the claim in cognitive science that theories ought to be computable. Computability is put forward not only as a desideratum but also as a necessary condition of adequacy. Is it cognitive, aesthetic, or pragmatic? One might want to answer that it is all of the these.

The analyses in this volume help us to identify the crucial values that play a role in science and maybe help us to sort out some of the criteria we can use to do so. Finally, it would be good to be able to elaborate the conditions for warranting certain values as necessary or central to the doing of good science. But maybe this is just vainglorious hope, and we should rest content with being able to clarify the multitude of values and value types that affect our doing of science.

Let us briefly shift attention to the doing of science. We have spoken of two places where nonepistemic values clearly enter science: in choosing research problems and in using results. But what about the role values play in the doing of science itself, in the very activity of scientific research? Certainly, there is much more to science than just

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research. Decision making in science comes at many different points and in many different ways. While the presence of epistemic values in research is rarely contested, it would seem most difficult to show the influence of nonepistemic values in this area. So our reasoning is, If we can show how nonepistemic values play a role in a research context, it should be easy to show that values play the same or similar roles in any other aspects of the scientific endeavor. Further, it seems easier to show how nonepistemic values occur in the context of discovery, but can we pinpoint where they show up, either as premises in inferences or in necessary presuppositions, in the context of justification?

How can we put some structure on this inquiry? Where in scientific research should we look, and how could we characterize scientific research that would direct attention to the fruitful places? Here is a strategy that has had some moderate success. Why not look at the "stages" of research as they are exhibited in the presentation of that research, namely, at the structure of research as exhibited in a research report or scientific paper. This puts us squarely in the context of justification. If we wished, we could relate each of these "demonstration" steps to the activities that led to the presentation of the research. In this case we could use the schema to move back to the context of discovery. Though, of course, discovery, with its feedback and bootstrapping operations, is never the linear process that most published research papers depict. Here are the six sections that scientific research papers typically have:

- 1. Choice of research project, problem statement, and review of previous literature.
- 2. Choice of "experimental" paradigm, taking into account technological availability, as well as background knowledge and conditions.
- 3. Implementation of experiments (or gathering of data); results of running the experiments.
 - 4. Interpretations of data and results.
- 5. Discussion section; reflecting on importance of results and integrating them into the existing literature.
- 6. Implications or uses of results (not often explicitly stated in research papers, except when researcher is seeking future funding).

Many who deny that science can (or should) be value free have focused on the first and last stages of this process, where the intrusion of seemingly extra scientific values is fairly obvious. An alternative to this model for inquiring into where values enter would be to look at the corresponding stages of developing, running, and completing a scientific research project. This would yield a relatively isomorphic set of stages but might focus attention more on the way values play a role in how a project is conceived and carried out (rather than trying to find their traces in a completed research report).

We have claimed that values enter into science, and particularly into scientific reasoning, in many places. Perhaps the easiest way to see this, and see it in a general way, is to think about the role of classification or categorization in judgment in general, and in scientific judgments in particular. Briefly, and in linguistic terms, to make a judgment is to attach a predicate to a subject. In the simplest cases, this is to make a claim about an object (the subject) that it truly exhibits the property ascribed by the predicate. In other words, to make a judgment is to classify or categorize a subject in terms of a predicate and say that it belongs to that class or category of things.

So in science to sort data into types, or search for data that relate to the theory being tested, is already an attempt to apply categories to particular things. Now, in a trivial way this categorizing is a social activity — people need to be trained in such practices as how to look for things under microscopes. In this way all categorization is just an instance of the fact that all cognitive or epistemic activity involves learning or training, and training is public and social in nature.

More interestingly, many times categorization involves values that are related to issues that are only indirectly attached to the judgment being made. For example, consider the determination of "brain death." Some of the major criteria for determining whether a person is brain dead are profound coma, no corneal reflexes, no cough or gag reflex, and no spontaneous respiratory attempts off ventilator for three minutes (American Medical Association and American Bar Association). This is in contrast, of course, to the older cardiorespiratory criteria of death. Brain death as the criterion for death first came to prominence in 1968, when it was put forward (in slightly different form) by an ad hoc committee of Harvard Medical School (Report 1968). The intentions of those on the committee were clear, that the function of this definition of death, versus the older definition, was to allow for organ harvesting, and so for the possibility of transplants. This is indicated by the guidelines about spontaneous respiratory attempts off ventilator — they read: "Note: If the patient is a potential organ donor, this test should not be done, or if done, should follow the protocol in ICU using 100% oxygen

and should be done only after consultation with the Transplant Coordinator."

Notice that whether or not this definition of death is good, fair, or adequate is a different question, demanding another set of arguments. In fact the Germans (in their "Guidelines of the Federal Chamber of Physicians") require that a claim of brain death must involve an irreversible condition that, in the case of primary brain damage, is reassessed and confirmed not earlier that twelve hours after their first pronouncement. In the case of secondary brain damage the reconfirmation must not be earlier that three days after the first assessment. Obviously, this could result in a delay in the harvesting of organs. But here we only point out that accepting brain death as a criterion resulted in a change in the way that persons are classified as dead that was motivated by concerns that incorporate values, namely, that death should allow for the harvesting of organs because organ transplants are valuable.

Another type of case came from Dr. Eric Rodriquez of the University of Pittsburgh Medical School's Geriatric Program. The case was presented in ethical grand rounds to second-year medical students, and it involved a seventy-eight-year-old woman who had fallen, become dehydrated, and was brought to the hospital by ambulance. Her daughter, after being notified, was concerned and distraught. She went on at length about how she worried about her mother, did not know how she could care for her, had two sick children, and so on. In short, the daughter was an emotional wreck. The medical summary for this case was that the mother was capable of being treated adequately as an outpatient but could not live alone in her own apartment.

Students were asked to pretend that they had to make the decision whether to admit the mother. In each group of medical students, the decisions always broke down the same way: Half said they would admit her, half said they would not. Rodriquez pointed out that this split depended on what the medical student thought was the proper role for a hospital. If the student viewed the hospital as primarily an acute-care facility, then there would be no room for the mother. If the hospital's function was to facilitate a broader concept of health, then the appropriate decision would be to admit the mother in order to give the daughter, the primary care-giver, a day or two to prepare herself and her family for her mother's "visit."

Clearly, this is another example in which values enter into decision making. The role someone assigns to a hospital's function depends on the value this person places on hospitals and how he or she assesses their role in the community. This is a big issue and itself involves many values—resource allocation, types of care provision available, scope of physicians' (and health professionals') responsibility to patients, among others. Such considerations about the role of hospitals, and other categorizations or assumptions similar to this one, directly affect decisions that physicians must make every day.

Most everyone is aware of the potential conflict of interest between the needs of a corporation, with its profit motive, and the needs of society to regulate corporations in the interest of public health. When examined closely, the arguments researchers make in their published findings are a mixture of stronger and weaker arguments that point to a conclusion coinciding with their goals as inferred from their place of employment. But this raises the interesting questions of when are bad arguments just bad arguments, that is, the result of faulty reasoning, when they are caused by more complex factors that in their sum constitute bad science, and when are they due to the intrusion of alternative goal-shaping values into the reasoning process. We have tried to show that values have many routes of entry in scientific research, and their presence alone does not make for good or bad science. If it is true that values must enter into scientific decision making and practice, and that the science itself and the character and adequacy of the results depend on these values, then it would behoove us, scientists and philosophers alike, to examine these values. So here is the call: Elucidate the value presuppositions. And, more importantly, be ready to critically assess them.

Values may be decried or defended, blamed or praised. But in a world that needs to strive for a modicum of reason, we urge that values must be critically examined. Values, at least of the kind discussed here, belong to the social world of people acting, so they must be able to be articulated and fit into the space of reasons; they must be articulable as premises in drawing inferences and conclusions. If this is right, critically assessing the values that play a role in scientific research is as crucial to doing good science as interpreting data. In fact, these processes are sometimes the same.

Objectivity

One of the reasons why people are so concerned about the role values play in science is their fear that the objectivity of science, which putatively gives it its unique epistemic status, would be compromised if

noncognitive values entered into the actual doing of science. As is well known, modern philosophy of science begins with logical empiricism. One of the axioms of logical empiricism is its noncognitivism, that is, the conviction that value judgments do not make assertions and, therefore, are neither true nor false. Consequently, there can be no knowledge of or truth about values. For logical empiricists, this in turn means that any value judgment, and in general any ethical norm, that pretends to say something true is just pernicious metaphysical gibberish. Value judgments transcend the field of possible rational discourse. Nobody made this clearer than Rudolf Carnap in his grand essay of 1931: "The (pseudo) statements of metaphysics do not serve for the description of states of affaires, neither existing ones (in that case they would be true statements) or non-existing ones (in that case they would be at least false statements). They serve for the expression of the general attitude of a person towards life ("Lebenseinstellung, Lebensgefühl"). . . . Metaphysicians are musicians without musical ability" (Carnap 1931).

This leaves us with a dilemma (a "value dilemma"): real science from its beginnings (choice of research topics) to its practical uses is replete with value evaluations, and these accrue in such a way that they cannot be eliminated for reasons of principle. Yet science ought to be objective, that is, independent of the personal or group preferences and idiosyncrasies (values included) of the people who conduct it. To put the value dilemma differently, on the one hand, in our real world the logico-empiricist ideal of value-free science cannot exist, and, on the other, the unavoidable value-ladenness of science, for strictly observing logical empiricists, makes science a basically irrational enterprise, lacking exactly the epistemic virtue, objectivity, that made for its success. This conclusion, as far as we know, has not been drawn by anybody close to logical empiricism, or to scientific philosophy, for that matter. Quite to the contrary, in this camp science is the objective enterprise par excellence.

The value dilemma points to a major defect in the overall strategy of logical empiricism: its concept of rationality. This concept is understood in a way that is too ideal and this means too restricted for the real world. It prevents logico-empiricists from doing what seems obligatory in order to save the objectivity of science, that is, reasoning (which above all is something rational!) about the values principally involved in their practice. Therefore, to save the objectivity of science, we must

free it from an ideal of rationality modeled after mathematics and logic; we must show that both rationality and objectivity come in degrees and that the task of good science is to increase these degrees as far as possible.

So the real question today is where and how particular values enter into science, and how values of many different kinds enter into the doing of "good" science and, concomitantly, how one may avoid "bad" values and thereby bad science. Focusing on these questions will allow us to consider the nature of rationality, objectivity, and knowledge in a new way so that we can address issues dealing with social and epistemic (or cognitive) values, especially how social and empirical normativity relate to normative criteria of evaluation. In passing, we shall remark on how all of these concepts relate to the "deep" nature of objective empirical science as practiced in socialized scientific communities. Much of this account was inspired by John Haugeland (1998).

Norms are like rules or the principles that guide regulated activities. They are embodied in performance skills; they are constitutive of knowing how to do something, be it intellectual, practical, or productive. They apply to individuals or groups. They apply in specific social locations. And they are public: they can be learned and observed and have the possibility of being used to correct actions or practices that do not accord with them. A norm is *constitutive* of a practice's being the kind of practice it is (the kind of game it is, the kind of form of life it is). It is by doing things "in this way," and only this way (though there is often some latitude), that a practice is exhibited or defined. Practices, of course, can change, be revised, be ignored, or be discarded. They exist only in specific locations at specific times. They are historical "objects."

Norms specify for individuals or groups when practices are being carried out correctly or properly. Those engaged in a practice, be it science or wine tasting, must be able to determine when a procedure being followed is incorrect (or illegal). This is necessary for understanding or evaluating correctness, and part of knowing what is correct is knowing which possibilities are excluded as incorrect. For example, we must be able to check a child's understanding of arithmetic or geography, not only that the child can give the right answers but also knows when others are wrong and can take steps to correct them. The child also needs to make moves toward correcting his or her own mistakes after making them. We may even demand more of the child, making the child exhibit the protocols by which he or she came up with

the answer and discuss why some other approach would have been inferior. The ability to check and correct within some conception of the space of possibilities allowed and disallowed by the normative constraints on a practice is what makes the difference between understanding and mere mechanical or rote performance. (This is one of the points that therapists have noted when requiring working through as a condition for experiential as opposed to just intellectual knowledge.)

These conditions on practices may make norms seem wholly social. And it is at this point in the exposition where social constructivists often stop. Yet they are justified in part. Norms are social. But what do we do about the objects and activities of nature that ought to be of concern to any good empiricist? For after all it is responsiveness to nature and nature's objects and their working that provides a, if not the, major demarcation criterion by which science is distinguished from other human practices. Any account of science must explain how nature, its objects, and its activities function in situations and practices of testing and how objects provide evidence.

We shall use the term "object" in what follows, for it clearly relates to the term "objective." But by "object" we mean the entities and activities that are part of nature or that are part of the causal structure of the world. Objects, as we know them, are conceptualized (maybe even linguistized). Objects are partly what they are because they play a role in the system of concepts we have in memory and in the inferences and expectations we have about them. This is what it means for them to be conceptualized. They act or function in a system (or sets of systems) of conceptual practices. Some of our knowledge consists in this interconnectedness, in the schemata or models that comprise our memory or knowledge "representation" systems. The systems involved here are not just declarative or semantic systems but also many grades and kinds of procedural systems.

Yet objects also figure in systems of physical practices and procedures, and here it may be easily understood how objects are recalcitrant. Sometimes objects do things we do not want, expect, or even know how to handle, intellectually or physically. No one can make a silk purse out of a sow's ear, no matter what practice one is engaged in. This was one of the reasons alchemy failed as science, yet its very possibility is one reason why it persists in the realm of fantasy. Humans cannot do with objects what they will or wish, for the objects constrain our very actions, including the activity of thinking.

If the objects, even as we conceptualize them, fail to perform as we had expected on the basis of our memorial schemata, then we have to step back and figure out what is going on in our normative, public schemata system, and so in our expectations. Our interactions with the world have upset the norms we thought were in place regarding what physical objects would do. In such cases we may change our practices, our expectations, or even our normative systems in which those objects figured. But recalcitrance is not always object driven. Sometimes it is experiential or proprioceptive. One cannot ride a bicycle without experiencing being able to balance or build a tower from children's blocks without a sense that they are being set up correctly. Such feelings are still part of the physical. Acting in the world is one of the major ways of getting involved with the physical. In fact, the physical recalcitrance of objects is not always unexpected. Often, the fact that objects place constraints on our actions is built into the conceptual scheme we have. This is why we do not flaunt the rules of the road while driving. We do not obey the rule not to drive on the wrong side of the highway because we may go to jail (social constraint), but rather because we may get hit by another car. We fear injury and death, outcomes that some kinds of objects can cause in us. In this line of reasoning lies the realists' point that one does not want a social constructivist to design our airplanes.

Yet, as already said, normativity depends on the conceptual and physical roles of those objects and their set of associated practices (including expectations and inference licensing) But another part of normativity depends on objects' recalcitrance, which affects our interactions with those objects. Physical objects carry their own set of constraints on our actions and practices, including the intellectual ones. But the physical and social norms involved here are not incompatible with one another. If they were, then the debate between the "realists" and the "social constructivists" would be right headed. It should be clear that it is necessary to have both.

Maybe this point can be clarified by looking at a perception case, by thinking about *seeing as*. If, for example, I see object X as F; then the F is part of the conceptual, categorical representation I have, and it has associated schemata that are the norms for Fs. But X is an object (mostly spatiotemporally discrete objects), and it has determinate physical properties and activities. If I hallucinate and have an F-like experience where there is no X, then I, and certainly others, may check